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ABSTRACT

Practices of teachers who use educational technology effectively are reviewed. The difference between the classrooms of exemplary users of technology and low technology users is in the way their classes are conducted. In exemplary classrooms, student use of learning technologies is woven integrally into the patterns of teaching even though technology-using teachers can use resources in different ways, such as drill and practice, simulations, problem-solving activities, and productivity tools. For the majority of teachers, integrating use of computers into the curriculum remains a practice at the cutting edge, since several studies indicate that exemplary technology users are but 5% of the teaching population. Integrating technology into the learning process takes a great deal of effort by the teacher, but teachers can be encouraged to adopt innovations in light of their own goals, the culture of the school community, and their own interpretations of the information they receive about new approaches. Most teachers cannot integrate computers into their classes without support. They need examples of computer use and training in computer techniques. As a result, exemplary computer-using teachers are likely to be found in districts that provide support for teacher learning and where leadership is concerned about equity of access. (SLD)

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TEACHING WITH TECHNOLOGY: EXEMPLARY TEACHERS

What does technology integration mean?

Integrating technology with teaching means the use of learning technologies to introduce, reinforce, supplement and extend skills. For example, if a teacher merely tells a student to read a book without any preparation for follow up activities that put the book in pedagogical context, the book is not integrated. In the same way, if the teacher uses the computer to reward children by allowing them to play a game, the computer is not integrated.

On the other hand, **integrating technology into curricula** can mean different things: 1) computer science courses, computer-assisted instruction, and/or computer enhanced or enriched instruction, 2) matching software with basic skill competencies, and 3) keyboarding with word processing followed up with presentation tools.

Why is integration of technology into instruction so important?

Teachers are critical to integrating technology into the learning process. They make the decision to integrate the technology by making it an internal part of their technique, or use it as an add-on, a "treat" or reward. Whether one uses a traditional instructional model or a contemporary one, most observers agree that technology needs to be better integrated in the educational process.

It is generally agreed that technology can help create a rich learning environment. This potential depends upon the teacher's ability to integrate the technology into everyday classroom activities. Integration requires a great deal of effort by the teacher. However, used appropriately, it can reinforce, supplement and extend student skills.

How does the classroom of exemplary technology-using teachers differ from low technology using teachers?

The difference between the classrooms of exemplary users of technology and low technology users is the way their classes are conducted. For instance, in exemplary classrooms student use of learning technologies is woven integrally into the patterns of teaching. The technology is used as a vehicle of expression, communication, or analysis as opposed to an activity isolated from the main purpose of the class.

Technology-using teachers use technology in different ways: drill and practice, tutorials, simulations, problem-solving and productivity tools. The types of instructional decisions they make are dependent on their knowledge of possible uses, availability and ease of use of the technology, and their instructional philosophy. As their philosophies change, as in restructured schools, the technologies and applications they use will also change. For example, teachers generally start with drill and practice and move to the tools approach.

A 1992 study, by Herman et al., showed that use of technology can influence instructional practices in a variety of ways.

- Technology use may encourage teachers to assign tasks which require students to engage in higher level thinking.
- Technology projects, more than regular classroom activities, tended to involve students in more integrative tasks, requiring them to access and use a variety of sources of information across the curriculum. In light of futurist visions of societal directions, this finding appears to be significant.

How do accomplished integrators use technology?

Teachers who are accomplished integrators use computers about the same amount of time as other computer users one half hour or more per day. Sixty-five percent indicate some every day use. They use technology as a tool for specific subject matter more frequently than other technology-using teachers.

Teachers who have integrated computers in the classroom and are considered heavy users in their classroom report that they use 1) text processing tools (95%), 2) instructional software (89%), 3) analytic and information tools (87%), 4) programming and operating systems (84%), 5) games and simulation (81%), and 6) graphics and operating tools (81%) (Sheingold & Hadley, 1990).

Is it difficult to become an accomplished integrator?

For the majority of the teachers, integrating use of computers in the curriculum remains a **practice at the cutting edge**.

Several studies indicate that exemplary technology-using teachers represent five percent of the teaching population (Becker, 1992; Sheingold & Hadley, 1990).

It is generally felt that most uses of learning technologies in classrooms, especially computers, make teaching more difficult. It takes planning to incorporate computers into a lesson, to sort out the logistics of who will use the equipment, to make sure the hardware and materials are available, and to design a fall back lesson if something goes wrong.

Integrating technology into the learning process takes a great deal of effort by the teacher. Someone has to know what software is available and appropriate, how to locate it, retrieve it, and capture it for classroom use. Someone needs to know what equipment to use and how to guide and encourage students' efforts to explore the subjects in more depth, how to organize the classroom to complement traditional teaching and make the connection in students' minds between computer trained skills and non-computer trained skills.

How can teachers become accomplished integrators of technology?

Teachers adopt innovations in light of their own goals, accustomed practice, culture of their community and school, and their own interpretations of the information they receive about new approaches. Therefore, it is appropriate to find uses of technology that support the instructional philosophies teachers have identified.

There seems to be a sequence from teaching without technology to becoming an **accomplished integrator**. Exemplary technology-using teachers were more likely to have begun using computers at the suggestion of their school level computer coordinator or a district coordinator, rather than starting on their own initiative or because of suggestions from school administrators or teaching colleagues (Becker, 1992).

Becker (1992) also found more computer-using teachers in schools where there were higher numbers of computer active teachers to provide a social network of computer-users. Only math teachers were likely to become exemplary users when there are few computer users in their school. Science and English teachers are particularly dependent on the presence of other computer-users to develop into accomplished integrators (Becker, 1992).

What can school divisions do to increase the number of accomplished integrators?

Even though some teachers are accomplished integrators, most teachers can't integrate without support. At worst, computers remain segregated in the back room, where "students come to visit the room where the machines live -- once in a while".

To move this practice into the mainstream, teachers and schools need information and resources in the following areas: 1) examples of what is possible, 2) examples of support and training, 3) information on results, 4) clearly identified subject area learning outcomes, and 5) learning to learn skills.

More experienced technology users suggest that teachers need to be shown clearly one way of using computers, either to alleviate their work outside class or enhance some part of their classroom work (Wiske et al., 1988).

Exemplary computer-using teachers are likely to be found in school districts with the following characteristics:

- **As likely to be found in low income, low SES districts as in high income, high SES sites.**
- **Districts where leadership is concerned about equity of access to computers across categories of students.**
- **Districts with organized support in the form of staff development activities and a full-time coordinator (Becker, 1992).**
- **Teacher support from administrators, department heads and technology coordinators for planning and scheduling lessons and reviewing materials (Hawkins & Sheingold, 1986; Loucks & Hall, 1982, and Martin, 1987, cited in Wiske et al., 1987).**
- **Software/hardware supports teachers administratively and academically, and supports student learning styles (Vision: Test, 1990).**
- **Smaller class sizes, favorable student/computer ratios (Becker, 1992).**

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Answers to questions found in this research brief have been synthesized from the MERC publications listed below. To obtain a copy, please contact the MERC office.

Pisapia, J. (1993, April). Learning technologies in the classroom: Case studies of technology intensive schools. 64 pp. ($8.50)

Pisapia, J., Schlesinger, J., & Parks, A. (1993, February). Learning technologies in the classroom: Review of literature. 213 pp. ($10.00)

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